REMARKS

In the May 16, 2007 Office Action, the Examiner rejected claims 1 and 3-12 under 35 U.S.C. § 103(a) as being patentable over Li, US 6,419,890. For the reasons provided below, Applicants respectfully submit that the claims as currently amended are patentable over the cited reference.

Claim Amendments

Applicants have added the following phrase to the independent claims (claims 1 and 8): "having nitrogen oxides stored during a storage phase, wherein during said regeneration the stored nitrogen oxides are released and converted to nitrogen." This amendment clarifies that regeneration refers to the release of previously stored nitrogen oxides. Support for this amendment may, for example, be found in the specification on page 3 in the first paragraph and on page 3 in lines 28 -30.

Claim 3 has been amended to remove the clause referring to the threshold temperature, which already appears in claim 1, the claim on which claim 3 depends. Applicants submit that these claim amendments do not add new matter.

Rejections Under 35 U.S.C. § 103(a)

The Examiner rejects claims 1 and 3-12 under 35 U.S.C. §103(a) as being allegedly unpatentable over U.S. Patent No. 6,419,890 (Li). Applicants respectfully traverse this rejection.

To establish obviousness of the claims, the Examiner must show that the teachings of the reference may be considered provided one of ordinary skill in the art would use the reference to solve the problem facing the inventor. *KSR International Co. v. Teleflex Inc.* 127 S. Ct. 1727, 1734 (April 30, 2007). Applicants respectfully submit that the cited prior art does not render the present claims obvious and one of ordinary skill in the art would not use this reference to solve the problem faced by the inventors.

The Examiner alleges that Li renders the present claims obvious because Li discloses a process for regeneration of a diesel engine NOx catalyst by regenerating with rich pulses at moderate temperature. However, the Examiner also notes that Li fails to disclose a first regeneration strategy of switching to rich pulses above the threshold temperature. Applicants

respectfully submit that because Li fails to teach this limitation of the presently pending claims, the Examiner has failed to demonstrate a *prima facie* case of obviousness and one of ordinary skill in the art would not use Li to solve the problem faced by the inventors.

The Examiner asserts that this limitation would have been obvious reading Li because Li discloses a rich environment in the diesel engine and lean NOx trappings and rich NOx trap regeneration at normal diesel operating temperatures of 150 – 450 degrees C, which would be obvious to one of ordinary skill, suggesting switching to the disclosed normal rich ratio while above the disclosed normal regeneration temperature. However, in Li at the higher temperatures, there is a desorption of sulphur oxides and not the release of stored nitrogen oxides. Because the desorption of sulphur oxides would lead to regeneration, a person of ordinary skill would not have any need to modify the process of Li to regenerate through the process of the claims as amended.

Applicants further note that their process is not obvious in view of Li because whereas in Li the processes apply pulses for sulphur regeneration at high temperatures (550°C, Li col. 8, lines 41-43, emphasis added), according to Applicants' claimed processes (step (c)), these pulses are applied below a threshold temperature for nitrogen oxides regeneration. Thus, because the Examiner has not demonstrated how Li's high temperature pulses for regeneration renders obvious Applicants' pulses at low temperatures (below the threshold temperature of 170°C to 250°C), Applicants respectfully submit that the Examiner has failed to render a *prima facie* case of obviousness.

Moreover, the Examiner asserts that "denitration" is not specifically recited in the claims (Office Action, page 3, item 3). Applicants have amended the claims to clarify that regeneration refers to the release of previously stored nitrogen oxides. Thus, the claims are further distinguished from Li.

Finally, Applicants note that the entire disclosure of Li is directed to the serious problem of sulfur poisoning of the NOx trap catalyst, when sulfur-containing fuels are used. In exhaust gas, sulfur is in the form of sulfur dioxide, which gets oxidized by the NOx trap to sulfur trioxide, which in turn is trapped by the NOx trap in the form of firmly bonded sulfates. This reaction is concurrent and in competition with trapping nitrogen oxides in the exhaust gas (in the form of nitrates). To restore the nitrogen oxides storage capacity, the NOx trap therefore has to

be de-sulfated and de-nitrated frequently. According to Li, conventional de-sulfation requires impractically high temperatures above 650°C at rich stoichiometry (col. 8, lines 36-38) because of the high binding energy of sulfates. Li solved this problem by designing a NOx trap catalyst that undergoes de-sulfation at 550°C while de-nitration can be performed within the normal operation window of the NOx-trap between 150°C and 450°C (Li col. 8, lines 60-62).

One of ordinary skill in the art on reading the entire disclosure of Li would understand that Li does not distinguish between de-sulfation and de-nitration, that is he groups both processes under the term "regeneration." By using rich pulses, Li's invention is that he could lower the temperature for de-sulfation to "moderate" temperatures of 550°C.

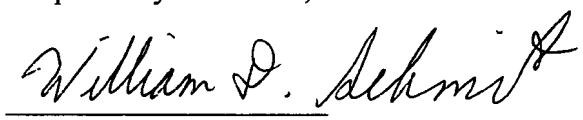
In contrast to Li, Applicants find that at exhaust gas temperatures below a threshold temperature (170°C to 250°C), de-nitration of NOx storage catalyst is not complete within normal de-nitration periods (*e.g.*, 5 to 20 seconds). Applicants also find that pulsed regeneration (de-nitration) may be used to heat up the NOx storage catalyst considerably improving regeneration (see, for example, the specification at page 7, lines 21-27 and Example 1). Therefore, there are two different regeneration strategies employed by the presently claimed invention, depending on the exhaust gas temperature: 1) multi-pulse regeneration when the exhaust gas is below a threshold temperature of between 170°C to 250°C and 2) above the threshold temperature range where de-nitration (regeneration) occurs with, for example, one rich pulse (e.g., 5 to 20 seconds). Li does not recognize the problem that de-nitration below 170°C to 250°C is not complete and that exhaust gas temperatures below 170°C to 250°C would require special attention and pulsed regeneration as currently claimed.

In summary, Li does not teach the features of two regeneration strategies of a rich pulse above the threshold temperature of 170°C to 250°C and multi-pulses below the threshold temperature 170°C to 250°C to regenerate the catalyst as presently claimed through the release of stored nitrogen oxides and their conversion to nitrogen. Li is trying to solve a different problem of sulfur poisoning of the NOx trap catalyst and not de-nitration of the catalyst as recognized by the presently claimed invention. Thus, Applicants respectfully request reconsideration and withdrawal of the obviousness rejection.

Pursuant to 37 CFR 1.136(a), an extension of time of three months is hereby requested. Authorization is provided to charge the requisite amount, as well as the fee for a Request for Continued Examination to Deposit Account No. 11-0171.

If the Examiner has any questions regarding the present application, the Examiner is cordially invited to contact Applicants' attorney at the telephone number provided below.

Respectfully submitted,



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